

Management Guide for **Jeffery Pine Beetle**

Dendroctonus jeffreyi Hopkins

The Jeffrey pine beetle (JPB) is the primary insect that attacks and kills Jeffrey pine.

Hosts

- Jeffery Pine

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Key Points

- These beetles typically breed in and kill slow-growing trees of reduced vigor.
- Tree mortality generally occurs in single-tree settings rather than in groups.

Outbreaks occur usually during drought periods.

After JPB penetrates the bark and reaches the junction of bark and wood, they construct their egg gallery by boring diagonally upward across the grain of the wood for 2 or 3 inches, then vertically parallel to the grain for an additional 2 to 4 feet. Each egg gallery is constructed by a

single pair of beetles. As construction of the gallery progresses, the female lays her eggs singly in niches along the sides (figure 3,B), and the gallery is then packed solidly with boring dust and frass.

Life History

The life cycle of JPB is ordinarily completed in 1 year in the northern part of the range, but in the southern part two generations per year may occur. Frequently, one complete and a partial second generation develop. The principal period of attack is in June and July, but attacks can also occur through September into early October. The beetle most often overwinters in the larval stage but will also overwinter in the adult stage.

The eggs hatch in 1-3 weeks. The length of the larval period varies considerably as most of the insects

overwinter in the larval stage. Mature larvae pupate in cells constructed at the ends of their galleries (figure 3, D).



Figure 1. Distribution of the Jeffrey pine beetle in North America.



Figure 2. Jeffrey pine killed by the Jeffrey pine beetle.

The pupae mature in about 10 days and then transform into adults. The adults emerge from

the pupal cells by tunneling out through the bark.

Identification

In diagnosing JPB as the cause of mortality, it is important to establish the infested tree is Jeffrey pine. The mountain pine beetle (*Dendroctonus ponderosae* Hopk.), a closely related insect, is practically indistinguishable from the JPB, and the two species make similar galleries. One of the hosts of the mountain pine beetle is ponderosa pine (*Pinus ponderosa* Dougl. ex Laws), a tree often found growing in association with Jeffrey

pine and can be incorrectly identified as Jeffrey pine. Some distinguishing characteristics between these two tree species include the bent-back prickle at the end of *P. jeffreyi* cone scales, the vanilla (and other) odors eluted by the cambial layer of *P. jeffreyi*. Jeffrey pine is also readily distinguished from *P. ponderosa* on the basis of bark, leader, needle, bud, and cone morphology (Haller, 1962).

Large, reddish pitch tubes (fig. 4) can be found projecting from the bark on all portions of the boles of infested trees. Pitch tubes mark the first points of attack and can be found long before the foliage begins to fade. Mid bole attacks are most common; however, attacks on the lower bole can be readily observed during outbreaks. Pitch tubes consist of boring dust and resin pushed out by the beetles when they bore into the tree. There are two types of pitch tubes. Pitch tubes on successfully attacked trees are pink to reddish in color and mixed with frass (a mixture of boring dust and beetle excrement). Pitch tubes resulting from unsuccessful attacks are creamy white to yellow and may lack frass. During drought years when trees produce little pitch, infested trees may lack pitch tubes and have only frass marking the points of attack. The green of the needles gives way to greenish yellow, to sorrel, and then to reddish brown.

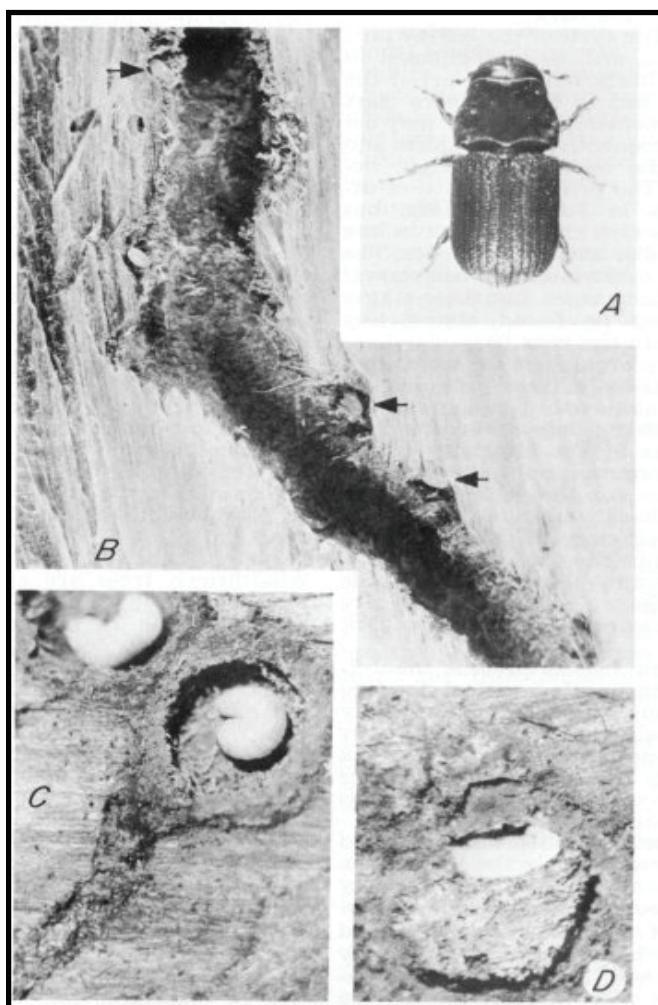


Figure 3. Life stages of the Jeffrey pine beetle:

A, Adult (5/16 in.);

B, eggs in niches in sides of egg gallery;

C, full-grown larvae;

D, pupa in pupal cell.

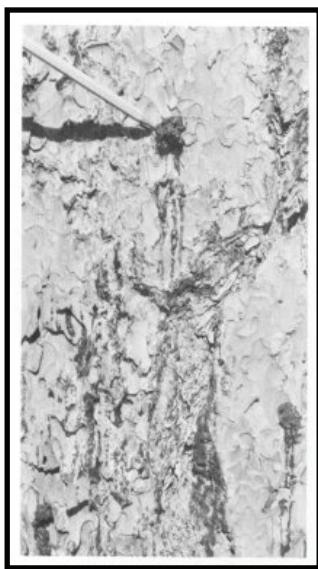


Figure 4. Pitch tube on outer surface of bark.

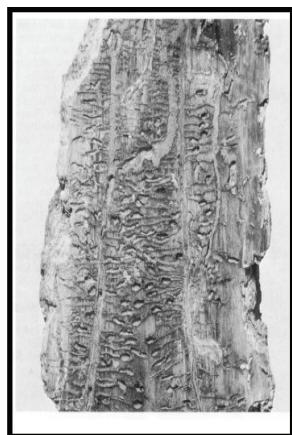


Figure 5. Egg galleries, larval galleries, and pupal cells on inner surface of bark.

Fading does not start until after the attacking beetles are well established, and their progeny partly developed. By the time the crown turns sorrel, the new broods are almost fully developed. When the foliage reaches the reddish-brown stage, the beetles have usually abandoned the tree.

The JPB is one of the larger species of *Dendroctonus* bark beetles. In the adult stage it is a stout, cylindrical beetle about five-sixteenths of an inch long and dark brown to black when mature (figure 3, A). The egg is oval and pearly-white (figure 3, B). The larva is a curved, white, legless grub with a yellow head (figure 3, C), and, when grown, it is about the same size as the adult. The pupa also is white but is slightly smaller than the mature larva (figure 3, D).

The galleries of the JPB are straight and vertical and often have a characteristic "J" shape and being packed with frass (figure 5). Galleries can range in length from about 10 inches to 30 inches. No other insect that breeds in Jeffrey pine makes galleries similar to these. If the broods are fully developed, larval mines will be seen extending across the grain and ending in open, oval-shaped pupal cells. If the beetles have matured and left the tree, the outer bark will contain many scattered, circular emergence holes. These are made when the adults burrow out from the pupal cells and disperse to attack other trees.

Management

Normally, the JPB is kept in check by its natural enemies, climatic factors, and the resistance of its host. During non-drought periods Jeffrey pine mortality caused by this beetle usually goes unnoticed.

Silvicultural

- Management activities that promote tree health and vigor will reduce the tree's susceptibility to successful attack by JPB.
- Maintaining basal areas appropriate for the site will limit tree losses during outbreak periods.

Suppression

Direct control – Direct control by removing infested trees can reduce the number of trees infested the next flight period.

- Felling and burning or peeling the bark are also useful methods if tree removal is impractical.

- Peeling the bark to expose the insects to the effects of weather and to predation by birds, ants, and other agents is should be conducted prior to the beetles reaching the pupal stage.
- Chemical treatments are also available to prevent successful JPB attacks. High value trees may be sprayed with a protective residual chemical to prevent successful attack. Protection can be gained for 1-2 years depending on the compound used. The chemical should be applied to the tree bole to run-off and should reach as high up the bole as the equipment will allow.

Prevention

Management objectives should be directed toward preventing, or at least substantially mitigating, development of epidemic beetle infestations. Once populations increase to an epidemic status and outbreaks become large, management of beetle populations, as well as other resources, becomes more complicated.

Other Reading

Furniss, R.L. and V.M. Carolin. 1977. Western forest insects. Misc. Publ. 1339. Washington D.C.: U.S. Department of Agriculture, Forest Service. 346 p

Haller, J.R. 1962. Variation and hybridization in ponderosa and Jeffrey pines. Univ. California Publications in Botany 34: 123-166.

Smith, S.L., Wenz, J.M., and R. Borys. 2002. Jeffrey pine beetle. USDA Forest Service. Forest Insect and Disease Leaflet 11. 11p.

Forest Health Protection and State Forestry Organizations

Assistance on State And Private Lands

Montana: (406) 542-4300

Idaho: (208) 769-1525

Utah: (801) 538-5211

Nevada: (775) 684-2513

Wyoming: (307) 777-5659

Assistance on Federal Lands

US Forest Service
Region One

Missoula: (406) 329-3605
Coeur d'Alene: (208) 765-7342

US Forest Service
Region Four
Ogden: (801) 476-9720
Boise: (208) 373-4227

